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(54) **Improvements in edible fats.**

(57) The invention relates to improvements in compositions comprising crushed seed material and edible fats and provides a composition comprising broken seed kernels or beans and one or more edible fats, CHARACTERISED IN THAT, the total fat present comprises at least 4%wt of fat with 6-24 carbon saturated fatty acids at the 2-position. In an embodiment, more than 5%wt, preferably 5-50%wt, more preferable 7-30%wt of the fatty acid residues at the 2-position comprise saturated fatty acids with a chain length of 12-16 carbon atoms. Such compositions comprise 10-30% by weight of a fat comprising at least 10%wt of 12 or 14 carbon saturated fatty acids and 90-70%wt crushed seed or bean material.

*Kernels + fat only*

**EP 0 475 510 A2**

The present invention relates to improvements in compositions comprising crushed seed material and edible fats.

Seeds, beans and nuts have found a place in human nutrition for many thousands of years, as a source of fat and/or protein.

For the purposes of this specification 'seeds' include the oil-bearing seeds of cottonseed, safflower, grapes, sunflower, rapeseed, maize, mustard and linseed; 'nuts' includes the oil bearing nuts such as, peanuts, hazelnuts, coconuts, cocoa, and almonds and 'beans' include the oil-bearing beans such as soyabeans.

The known uses of seed, bean and nut materials in food-stuffs are described hereafter with particular reference to sunflower seed.

The kernels of sunflower seeds find uses in confectionery and bakery products. Known uses for sunflower kernels include blending with honey, butter and salt to make a spread, as a nut substitute in candies, cookies and muffins, for sprinkling on syrup on pancakes or waffles, blending in cake frosting, adding to meat fish and vegetable dishes, as an ice cream topping, a fondue dip, adding to or sprinkling on salads and as a snack food. Recipes for some of the above compositions are available from one or more of the following sources: Fisher Nut Company, St Paul, MN 55114 USA; Dahlgren and Company, Crookston MN 56716 USA and Sigco Sun Products, Breckenridge MN 56520 USA. Similar uses are known for other oil seeds, beans and nuts.

Some nuts of high oil content are known have rather more specialised uses. For example is known to prepare 'peanut butter' by crushing peanuts and mixing the pulped material thus obtained with one or more fats and oils. Peanut butter compositions are described in EP 0381259. Similar 'Hazelnut Butter' is a known traditional in several European countries.

Oils and fats may be conveniently described by reference to the fatty acid composition of their constituent triacyl glycerides, both as regards the length of the carbon-chain in the constituent residues of fatty acids and the positional isomerism of these residues on the glycerol backbone. For the type of fatty acid residues it is convenient to use the notation given below in **TABLE 1**, as used throughout this specification;

TABLE 1

S	stearic acid,	(18-carbon)
P	palmitic acid	(16-carbon)
M	lauric fats	(12-14 carbon)
H	stearic + palmitic	(16-18 carbon)
O	oleic acid	(18 carbon mono-unsat.)
L	linoleic acid	(18 carbon di-unsat.)
E	mono-trans fat	(16-18 carbon mono-unsat)
U	oleic + linoleic	(18 carbon unsaturated)

A plurality of patents describe the manufacture of fats comprising particular levels of specified tri-acyl glycerides.

For example, US 4267643 discloses some of the S2E and SES ratios which can be obtained by non-fractionated but hydrogenated vegetable oils: JP 54/034305 and JP 52/069411 disclose specific S2U, SU2, S3 and U3 ratios obtained by mixing of co-randomised vegetable fats: the effect of S2O triglycerides on the physical properties of a fat is discussed in EP 78568 and US 4447462 whereas the effect of S2U triglycerides on physical properties is discussed in EP 109721.

Certain other triglycerides are only present at low levels in naturally occurring oilseeds. The so-called H2M triglycerides, which comprise two fatty acid chains of 16-18 carbon atoms and one fatty acid chain of 12-14 carbon atoms are found at levels of 1.5% in coconut fat, 1.2% in palm oil, 1.0% in palm kernel fat. Non-vegetable and indirect sources of these triglycerides comprise butterfat which contains around 6.0% of H2M and edible tallow which comprises around 8.5%: coconut fat hardened to a slip m.p. of around 34°C (8.8%), hardened and interesterified coconut fats (above 10%), hardened palm kernel fats (12.8%) and interesterified and fractionated blends of hardened palm and palm kernel fats (above 36%).

Edible seeds and beans are known to exhibit characteristic positional distributions as regards the location of the fatty acid residues on the glycerol "backbone" of their triglycerides. **TABLE 2**, given below, illustrates this positional isomerism by reference to the percentages by weight of fatty acid residues overall and at the 2-position on the glycerol "backbone" of the tri-glyceride.

TABLE 2

Component Fatty Acids of Oilseeds Type and Positional Isomerism														
	all	2'	all	2'	all	2'	all	2'	all	2'	all	2'	all	2'
	Sunflower		Safflower		Soybean		Cottonseed		Grapeseed		Maize		European Rapeseed	
Saturates														
C 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C 12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C 14	0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0	0	0
C 16	7	1	7	3	11	1.5	24	0.5	0	0	0.5	0.5	0	0
C 18	4	0.5	3	1	3.5	0.5	2.5	2.5	7.5	1	13	2	3	1
C 20	0.5	0	0	0	0	0	0.5	0.5	3.5	0.5	2.5	0.5	1	0
C 22	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.5
C 24	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0
Monos														
C 16	0	0	0	0	0	0	1	1	0.5	1	0	0	0.5	1
C 18	24	24	13	25	23.5	25	18	31.5	15.5	19	30.5	34.5	13	34
C 20	0	0	0	0	1	0	0	0	0	0	0.5	0.5	9.5	0.5
C 22	0	0	0	0	0	0	0	0	0	0	0	0	48	1
Diunsats														
C 18	63.5	73	77	71	53	67	53	63	73	77.5	51.5	61.5	13.5	40
C 20	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0
C 22	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0
Triunsats														
C 18	0.5	1	0	0	7.5	6	0	0	0.5	1	1	0.5	9.5	22

From TABLE 2 it can be seen that the both the seeds (sunflower, safflower, cottonseed, grapeseed, maize and (European) rapeseed) and the soybeans exhibit specific preferences for certain fatty acids at certain positions.

According to one embodiment of the present invention there is provided a composition of matter comprising broken seed kernels or beans and one or more edible fats wherein the total fat present comprises at least 4%wt of fat with 6-24 carbon saturated fatty acids at the 2-position.

Preferably the total fat present comprises at 4%wt of fat with 12-16 carbon saturated fatty acids at the 2-position. In the more preferred embodiments of the invention, more than 5%wt, preferably 5-50%wt, more preferably 7-30%wt of the fatty acid residues at the 2-position comprise fatty acids with a chain length of 6-24, more preferably 12-16 carbon atoms.

As stated above, known edible fats obtained from known seeds do not comprise such levels of triglycerides with 6-24 carbon fatty acids at the 2-position. Such tri-glycerides are found in the oil palms and can be obtained from nuts like the coconut. Crushed nuts are excluded from the scope of the present invention: which is limited to compositions comprising at least one fat which has been modified by chemical methods or obtained through genetic modification of the source plant so as to increase the 6-24 carbon fatty acid content and preferably the content of 12-16 carbon fatty acids at the 2-position of the constituent triglycerides.

In one embodiment of the present invention the total fat present includes a triglycerides of the so-called H2M type, at a level of 5-91%wt on fat phase, preferably the H2M type fat is present at 10-90%wt, more preferably 15-50%wt of the fat phase.

In a further embodiment of the present invention the total fat present includes a triglyceride of the so-called SSS type at a level of 5-91%wt on fat phase, more preferably 10-90%wt, most preferably 15-50%wt of the fat phase.

Both the H2M and the SSS triglycerides are known components of known margarine hardstocks and it is envisaged that genetic modification techniques can be employed to manipulate the content of these triglycerides in the oilseed per se.

In such compositions of seed material and H2M the content of 6-24 carbon fatty acids and preferably

12-16 carbon fatty acids at the 2-position is most preferably at least 5% on fat phase. Other fats having a relatively high melting point as compared to the liquid seed oils can replace the H2M and SSS fats. Such fats are can be obtained by modification of the triglycerides present in, for example, the fat and soybeans of EP 369519.

5 In a particularly preferred embodiment of the present invention, the composition comprises 10-30% by weight of a fat comprising at least 10%wt of 12 or 14 carbon saturated fatty acids and 90-70%wt (i.e. the balance up to 100%) crushed seed or bean material. Such compositions can be obtained by simple mixing of crushed seed material with a suitable fat or by crushing of seeds containing a suitable fat.

Suitable broken seed kernels are obtained from one or more of a plant selected from sunflower, rape, saf-flower, mustard, flax, cotton, maize, and grape.

10 Suitable beans include soybeans. Sunflower and rape seeds as well as soybeans are particularly preferred.

It is advisable for dietary and nutritional reasons that the level of trans fatty acids in the products according to the present invention should be as low as possible. Low levels of trans fatty acids can be 15 ensured by ensuring that hydrogenation under trans-promoting conditions is avoided. This can be ensured by an appropriate choice of catalyst or the use of natural fatty materials. Trans-fatty acids are rarely found in natural fats.

In order that the present invention may be further understood it will be described hereafter by way of an example embodying the invention and relating to one method for preparation of materials for use in the 20 manufacture of confectionery. While the invention is described with reference to a particular use it is not our intention to limit the scope of the invention to this use as other applications of the invention are envisaged: including the use of the products claimed as animal feeds or as a base for the manufacture of edible spreads and other fatty products.

#### 25 EXAMPLE

One kilogram of sunflower kernels were placed in a "Moulinex (RTM) food-processor and ground for 10-15 seconds. The grounds comprised fragments of kernel ranging in size from 3mm to less than 0.5mm (large dimension). In repeated experiments the grounds were either mixed with 150g of a fat (experiments A 30 and B) as described below or pressed into blocks without the addition of fats (experiment C). The quality of the resulting blocks was assessed by placing a single block in a paper cup (of the type used in a coffee dispensing machine) and shaking the cup by hand. This simple method was found to be sufficient to demonstrate the difference between the stability of the blocks obtained in the three types of experiment.

The fat used in experiment (A) comprised an wet-fractionated, mid-fraction, of an inter-esterified blend 35 of hardened palm fat and hardened palm kernel fat. This fat comprises a H2M type fat. The paste-like material obtained from the grounds and this fat could be pressed into block-like shapes which retained their form when agitated, and which were suitable for use as the filling of a confection or as a confectionery ingredient.

The fat used in experiment (B) was a commercially available sunflower oil. Blocks were difficult to form 40 from the grounds and this material and fell apart when the cup was shaken lightly.

In the control experiment (C) no fat was added. No blocks could be formed from the grounds which were chalky and powdery in the absence of added fat.

The overall fat content of the blocks formed in experiment (A) was determined by extraction of the fat present with ether and subsequent analysis of the fats present in the extract. The result of analysis of total 45 fatty acid content and 2-position fatty acid content is given in **TABLE 3** below. All results are given in wt%.

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TABLE 3:

Acid	total	2-position
<b>Saturates</b>		
C-8	0.2%	-
C-10	0.4%	0.1%
C-12	8.0%	7.1%
C-14	2.9%	3.0%
C-16	12.0%	9.0%
C-18	15.3%	12.8%
C-20	0.3%	0.1%
C-22	0.5%	0.1%
<b>Mono-unsaturates</b>		
C-18	12.2%	11.2%
<b>Di-unsaturates</b>		
C-18	48.0%	56.4%

It can be seen that the total content of 8-22 carbon fatty acid residues at the 2-position is around 31%wt and that almost 20%wt of the saturated fatty acids at the 2-position are 12 to 16 carbon saturated fatty acids.

#### Claims

- Composition comprising broken seed kernels or beans and one or more edible fats, CHARACTERISED IN THAT, the total fat present comprises at least 4%wt of fat with 6-24 carbon saturated fatty acids at the 2-position.
- Composition according to claim 1 wherein the total fat present comprises at least 4%wt of fat with 12-16 carbon saturated fatty acids at the 2-position.
- Composition according to claim 2 wherein more than 5%wt, preferably 5-50%wt, more preferable 7-30%wt of the fatty acid residues at the 2-position comprise saturated fatty acids with a chain length of 12-16 carbon atoms.
- Composition according to any of claims 1-3 wherein the fat comprises a H2M type triglyceride at a level of 5-91%wt on fat phase.
- Composition according to claim 4 wherein the H2M triglyceride comprises 10-90%wt, preferably 15-50%wt of the fat phase.
- Composition according to any of claims 1-3 wherein the fat phase comprises an SSS type triglyceride at a level of 5-91%wt on fat phase.
- Composition according to claim 6 wherein the SSS triglyceride comprises 10-90%wt, preferably 15-50%wt of the fat phase.
- Composition according to any of claims 1-3 comprising 10-30% by weight of a fat comprising at least 10%wt of 12 or 14 carbon saturated fatty acids and 90-70%wt crushed seed or bean material.
- Composition according to any of claims 1-8 wherein the broken seed kernels are obtained from one or more of a plant selected from sunflower, rape, safflower, mustard, flax, cotton, maize, and grape.
- Composition according to any of claims 1-8 wherein the broken beans are broken soybeans.

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(54) **Improvements in edible fats.**

(57) The invention relates to improvements in compositions comprising crushed seed material and edible fats and provides a composition comprising broken seed kernels or beans and one or more edible fats, CHARACTERISED IN THAT, the total fat present comprises at least 4%wt of fat with 6-24 carbon saturated fatty acids at the 2-position. In an embodiment, more than 5%wt, preferably 5-50%wt, more preferable 7-30%wt of the fatty acid residues at the 2-position comprise saturated fatty acids with a chain length of 12-16 carbon atoms. Such compositions comprise 10-30% by weight of a fat comprising at least 10%wt of 12 or 14 carbon saturated fatty acids and 90-70%wt crushed seed or bean material.

**EP 0 475 510 A3**



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## EUROPEAN SEARCH REPORT

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EP 91 20 2242

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-4 198 439 (M.W. HOOVER)	1, 4, 9, 10	A23D9/00
Y	* column 2, line 37 - line 40; claims 1, 6, 8, 11 *	2-8	A23L1/36
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Y	GB-A-2 185 990 (UNILEVER PLC)	2-8	A23K1/16
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	* page 2, line 40 - line 32; claims 1, 2, 7, 9 *		
	* page 2, line 75 - line 115 *		
	* page 3, line 42 - line 47 *		
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A	EP-A-0 369 516 (THE PROCTER & GAMBLE COMPANY)	1, 2, 6	
	* page 6, line 22 - line 28; claims 1, 2, 4, 5; examples 5, 9 *		
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A	US-A-3 278 314 (E.E. COLBY AND J.W. PHENIX)	1-8	
	* column 1, line 63 - column 2, line 32; claim 2 *		TECHNICAL FIELDS SEARCHED (Int. Cl.5)
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	* page 13, line 7 - line 26; claims 1-4 *		A23L
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A	PATENT ABSTRACTS OF JAPAN	1, 9	
	vol. 10, no. 280 (C-374) 24 September 1986		
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 23 APRIL 1992	Examiner KANBIER D.T.
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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